

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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NOTES ON WESTERN SPECIES OF PELLAEA.\*

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The following notes relate chiefly to the taxonomy of the southwestern ferns for many years loosely associated under the name *Pellaea Wrightiana* Hook., to which Christensen† has recently assigned the name *Pellaea mucronata* D. C. Eaton, in error. It is necessary to apply the name *mucronata* to a quite different plant, namely the California species long passing as *P. ornithopus* Hook., and to recognize three distinct species in the *Pellaea Wrightiana* of recent writers.

The name *mucronata*, as applied to any species of the genus *Pellaea*, dates from 1856, with the publication of *Allosorus mucronatus* D. C. Eaton, based wholly on small specimens collected "in the hills near the bay of San Francisco, California," by Major A. B. Eaton. This material, recently examined, clearly bears out Eaton's later statement‡ that his "original *Allosorus mucronatus* was founded on small specimens of *P. ornithopus*, of Hooker" (1858). In the Botany of the Mexican Boundary Survey (1859), however, Eaton had transferred *A. mucronatus* to *Pellaea*, making *Pellaea mucronata* include (in addition to *P. ornithopus* Hook.) the two southwestern forms described in 1858 as *Pellaea Wrightiana* Hook. and *P. longimucronata* Hook. Recognizing subsequently the error of associating the distinctively Californian plant with the new southwestern plants, and objecting (loc. cit.) to Baker's use of the name *mucronata* for the latter, Eaton yet failed to take up the name *mucronata* for the Californian plant, and on the contrary wrote *Allosorus mucro-*

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† Ind. Fil. 481. 1906.

‡ Ferns N. Amer. 2: 8. 1880.

*natus* as a straight synonym of *Pellaea ornithopus* Hook.\* The latter name, though singularly appropriate, must evidently give way to *Pellaea mucronata*, limited to the abundant California plant.

Not much attention appears to have been given to the *Pellaea Wrightiana* and *P. longimucronata* of Hooker, founded respectively on nos. 2130 and 2131 of Charles Wright's New Mexican collections of 1851-52. They have been regarded as forms of a single species, *P. Wrightiana*. Actually they represent two species, and the characters by which they may be distinguished are those given originally by Hooker and restated by Davenport, † the latter recognizing *longimucronata* only varietally, however. Davenport's variety *compacta* appears to be a valid species, allied to *P. mucronata* (*P. ornithopus*).

The synonymy and range, and some of the distinctive characters of the four species, are given below. The rhizome scales exhibit such pronounced variation in nearly all respects as to be of far less importance than is usual, and characters drawn from them are purposely omitted.

***Pellaea mucronata*** (D. C. Eaton) D. C. Eaton in Torr. U. S. & Mex. Bound. Bot. 233. 1859.

*Allosorus mucronatus* D. C. Eaton, Amer. Journ. Sci. II. 22: 138. 1856.

*Pellaea ornithopus* Hook. Sp. Fil. 2: 143. pl. 116. A. 1858.

*Allosorus ornithopus* Kuntze, Rev. Gen. Pl. 2: 806. 1891.

*Type*.—Collected on "hills near the bay of San Francisco, California," by Major A. B. Eaton. The label accompanying the specimen gives the additional locality "Monte Diablo."

*Distribution*.—Widely distributed in California, occurring from Mendocino County southward in the Coast Ranges to San Diego County and Lower California, and from Shasta and Lassen Counties southward through the foothills of the Sierra Nevada, ascending to 1,650 meters in El Dorado County, or possibly higher. ‡

An extremely variable species, showing the utmost diversity in size, number, and spacing of segments, according to season, habitat, and geographical position. What may be regarded as the normal form is that figured by D. C. Eaton in Ferns of North America, § but there are many departures from this, the more noteworthy being (1) extremely luxuriant specimens from Los Angeles County, with pinnae alternate, many of

\* Op. cit., 2: 12.

† Cat. Davenp. Herb. Suppl. 45, 46. 1883.

‡ Reported by Watkins (Fern Bull. 10: 70. 1902) to ascend to 9,000 feet in the Sierra Nevada.

§ 2: pl. 47, figs. 7-10.

them more than 10 cm. long; (2) specimens from the vicinity of Tehachapi, in Kern County, with exceedingly small, numerous, close-set segments; (3) long-stalked fronds from Lassen County (*Austin* 1367) which suggest *P. brachyptera* but are readily distinguished from that by their very much longer secondary rachises and shorter, smaller pinnules. The northern specimens show a tendency toward simple pinnules (secondary pinnae); whereas in specimens from Whitewater (*G. R. Vasey*) the larger secondary pinnae consist of as many as 9 to 11 sessile segments. Entirely characteristic specimens are at hand from northern Lower California (*Mearns* 3493, 3791); also from Santa Catalina Island, where the plant is called "tea-fern," from its use for tea. According to A. A. Eaton, who has discussed this species very interestingly,\* it is called also "black fern" and "poison-fern," the latter name indicating its reputed poisonous effect upon sheep.

The fronds of *P. mucronata* are almost invariably fertile. The segments are thick, sharply mucronulate, revolute to the middle at all stages of growth, and often transversely corrugate at maturity, with the margins closely repand and finely sinuate-dentate. The more subdivided lamina and the absence of sterile fronds will at once distinguish this species from the occasional fronds of *P. longimucronata* with small segments. The relationship with *P. compacta* is decidedly closer.

***Pellaea Wrightiana*** Hook. Sp. Fil. 2: 142. pl. 115. B. 1858.

*Pellaea mucronata* D. C. Eaton in Torr. U. S. & Mex. Bound. Bot. 233. 1859, in part; not *Allosorus mucronatus* D. C. Eaton, 1856.

*Type*.—Collected in New Mexico, in 1851, by Charles Wright (no. 2130), the exact locality not stated. According to data in the Gray Herbarium† it was collected on "mountains around the Cobre. On rocky ledges, October 20." "Cobre" is one of the names for Santa Rita, a mining camp in Grant County, altitude 1900 meters, about 15 miles east of Silver City.‡ A specimen of *Wright* 2130, agreeing closely with Hooker's figure, is in the U. S. National Herbarium.

*Distribution*.—Southwestern Oklahoma and central Texas to Arizona and Lower California.

Fronds mostly fertile, at least in the upper half or two-thirds, occasionally wholly sterile; lamina linear or in large well developed specimens sometimes lanceolate or narrowly triangular, the basal pinnae reduced or not; pinnae short, in some plants all but the upper one trifoliate (these gradually simpler), in others the middle and sometimes the basal pinnae with 2 or occasionally 3 pairs of pinnules besides the large terminal one, the upper pinnae trifoliate, finally simple; pinnules distant, nearly equal, relatively large, semiadnate or sessile, the fertile ones closely revolute one-half to one-third the distance to the middle, flattish, the margin entire or nearly so, slightly altered, evident at the apex as a

\* Fern Bull. 12: 113, 114. 1904.

† See Standley, Contr. U. S. Nat. Herb. 13: 175. 1910.

‡ Op. cit. 170.

narrow cartilaginous border to the short mucro; sterile pinnules similar but broader, plane, the margin pale, thinnish; leaf tissue coriaceous, light green, slightly glaucous.

Readily distinguished from *P. longimucronata* Hook., with which it is contrasted below. It has sometimes been distributed mixed with *P. longimucronata* and apparently grows in company with that in several localities, but the ranges though similar do not coincide, *P. Wrightiana* extending farther to the east. The Oklahoma record is of specimens collected at Quanah Mountain in 1891 by C. S. Sheldon (no. 192), listed\* as *P. ternifolia*. The central Texas specimens are from Llano and Gillespie Counties (*Bray* 303, *Reverchon* 1216, *Jermy* 351), and the other Texas plants are from the Chenate and Cornudas Mountains (*Havard*). In New Mexico it has been collected in the Burro Mountains by Rusby and in the Organ Mountains by Wooton and Standley, and has been re-collected at the type locality by J. M. Holzinger, August 27–September 12, 1911. There are numerous Arizona specimens, coming from several parts of the State but largely from the mountain ranges of Pima and Cochise Counties, and there is a single specimen from Lower California (El Rancho Viejo, April 29, 1889, *T. S. Brandege*). The species ascends to at least 2,400 meters in the Chiricahua range (*Blumer* 1867).

***Pellaea longimucronata*** Hook. Sp. Fil. 2: 143. pl. 115. A. 1858.

*Pellaea Wrightiana longimucronata* Davenp. Cat. Davenp. Herb. Suppl. 46. 1883.

*Pellaea truncata* Goodding, *Muhlenbergia* 8: 94. 1912.

*Type*.—Collected in New Mexico, in 1851, by Charles Wright (no. 2131), the precise locality not given. According to a note by Wooton, accompanying a specimen of this number in the National Herbarium, it was collected on "mountain sides near Conde's Camp, Sept. 1, 1851," Conde's Camp being in the western part of Grant County, near the Arizona boundary. The specimen accords with Hooker's description and illustration.

*Distribution*.—Southwestern New Mexico to southern Utah, extreme southern Nevada, and western Arizona; also in south-central Colorado.

Fronds mostly fertile, but sterile fronds much commoner than in *P. Wrightiana*, partially fertile ones less common; lamina triangular-ovate, fully bipinnate almost to the acuminate simply pinnate apex; middle and basal pinnae of fertile fronds the largest, the pinnules (6 to 10 pairs) rigidly divaricate, small, usually decreasing in size toward the reduced apical segment, all sessile or short-petiolate, articulate, many of them deciduous after maturity; fertile pinnules sharply mucronate, very strongly revolute (the edges frequently meeting), the margins slightly modified, paler, usually somewhat erose-denticulate; sterile pinnules fewer, larger, relatively broader, often truncate, conspicuously long-mucronate, the margins plane or repand, erose-denticulate or sometimes

\* Contr. U. S. Nat. Herb. 1: 201. 1892.

irregularly short-spinulose; leaf tissue extremely coriaceous, grayish green, pruinose.

*Pellaea longimucronata* differs from *P. Wrightiana* in having the lamina broader and truly bipinnate nearly throughout, trifoliate pinnae mostly wanting; in its smaller and more numerous pinnules, these more rigid, more slenderly mucronate, and distinctly articulate, being more or less deciduous with age from the short knob-like petiolules; and in its harsher, much more coriaceous texture, the pinnules more strongly revolute and having an altogether characteristic grayish-pruinose appearance. These characters, though previously noted, have not recently been regarded as of importance. Yet they were regarded as sufficient for the establishment of two new species by so conservative a botanist as Hooker, who had, moreover, only very scant material; and in the great number of specimens now at hand they are so easily made out and so unmistakable as to leave no doubt of the specific distinctness of the two forms. The supposed intermediate states mentioned by Eaton have not been seen and certainly are not found in his own herbarium, his specimens being definitely referable to one species or the other in about equal number.

*Pellaea longimucronata* is apparently very much commoner than *P. Wrightiana*. It is abundantly represented from New Mexico in the collections of Wootton and Standley in the Organ Mountains, and of Rusby in the Burro Mountains. It is widely distributed in Arizona, being especially common apparently in the Santa Catalina Mountains, here as in the Organ Mountains and elsewhere occurring in association with *P. Wrightiana*; the type of *P. truncata* is from the Mule Mountains. The Colorado record is of specimens collected at Canyon City, Fremont County, by Brandegee,\* and this is the only locality given in Rydberg's Flora of Colorado; it is substantiated by a specimen in the Eaton Herbarium. The single Utah specimen at hand is from Silver Reef, altitude about 1,050 meters, Jones 5,149 aq. The Nevada specimens are two: Virgin River, Bunkerville, Goodding 737; Mica Spring, altitude 1,200 meters, Jones 5,055. The last cited specimen includes a frond showing the proximal basal pinnule of the basal pinnae fully pinnate, with three distinct segments.

***Pellaea compacta* (Davenp.) Maxon, sp. nov.**

*Pellaea Wrightiana compacta* Davenp. Cat. Davenp. Herb. Suppl. 46. 1883.

Rhizome woody, multicipital, the branches nodose, short-creeping, 1 to 2 cm. long, about 1 cm. thick, freely radiceous beneath, densely paleaceous, the scales dark brown in mass, forming a close tufted covering, linear, long-attenuate, falcate or straight, the characteristic larger ones 5 to 7 mm. long, 0.5 to 0.7 mm. broad, with a broad, thick, strongly sclerotic, dark brown, lustrous median band, the borders thin, pale, transparent, plane or distinctly repand, conspicuously and irregularly denticulate; fronds numerous, closely fasciculate, mostly fertile, 20 to 35

\* Port. & Coult. Syn. Fl. Colo. 153. 1874.

cm. long, the thick glossy dark brown flexuous stipes mostly much longer than the lamina, glabrous; lamina narrowly oblong, acuminate, 9 to 13 cm. long, 2.5 to 4.5 cm. broad, bipinnate; pinnae about 15 pairs, usually oblique in drying, the basal pair distant, those above gradually closer, those of the apical portion contiguous or imbricate, gradually or abruptly simple; pinnules of the larger pinnae 5 to 7 pairs, simple, nearly uniform, mostly close, sessile or very short-stalked, with a short cartilaginous mucro, the sterile ones oval or oblong, plane, punctate beneath and with the margins minutely erose; fertile pinnules narrower, broadly revolute, often conduplicate and falcate with age, transversely wrinkled, the slightly thinner margins repand and finely sinuate-dentate; sporangia borne in a broad marginal zone, almost wholly concealed; leaf tissue rigidly spongiose-herbaceous, the surfaces light or grayish green.

Described originally by Davenport as "a remarkable distinct form with long stipites and densely crowded compact pinnules, collected in the San Bernardino Mts. of California by W. G. Wright." This collection is not represented in the National Herbarium, but there is a specimen in the Eaton Herbarium, collected in 1879 and ticketed in Wright's hand as "gathered on Mt. San Bernardino at an altitude of 7,000 ft.," which is undoubtedly typical. It is marked by Eaton "var. *californica* Lemmon," a name apparently unpublished, and agrees with another Eaton specimen, under the same name, marked "San Jacinto Mt., Parish brothers, 1880." According to Parish\* the plant is "frequent in the San Bernardino and San Jacinto Mts., growing in stony soil on dry slopes at 6,000 to 8,000 ft. altitude," and "has been collected by Brandegee in the Providence Mts., in the Mojave Desert."

The following specimens are in the National Herbarium: Among rocks on steep sides of San Jacinto Mountain, July, 1881, *S. B. & W. F. Parish* 511; Snow Canyon, San Bernardino Co., alt. 1,800 meters, June 20, 1901, *S. B. Parish* 5050; stony ridges, San Antonio Mountains, July 11, 1902, *Abrams* 2684; south slope, Sugarloaf, San Bernardino Mts., alt. 2,400 meters, forming "dense low clumps in slides," July 11, 1906, *J. & H. W. Grinnell* 215.

*Pellaea compacta* is allied to *P. mucronata*, agreeing in most general characters, but differing sufficiently in its simple, less sharply mucronate pinnules, its congested habit, its long-stipitate fronds, and its more broadly striped rhizome scales. With *P. Wrightiana* it has no close connection whatever, and from *P. longimucronata* it differs widely in its lesser size, its congested pinnae, and its close, very short-pointed fertile pinnules, these not only revolute to the middle but commonly conduplicate and distally falcate. Apparently *P. compacta* grows in company with *P. mucronata*, and it would be interesting to study their relationship in the field.

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\* Fern Bull. 12 : 8. 1904.